

Final For Docket: January 17, 2002

Preliminary Impacts Assessment

Interim Standards for Hazardous Air Pollutants for Hazardous Waste Combustors

Economics, Methods, and Risk Analysis Division
Office of Solid Waste
U.S. Environmental Protection Agency
401 M Street, SW
Washington, DC 20460

January 17, 2002

Background, and Purpose:

On September 30, 1999, we (EPA) promulgated final standards to control hazardous air pollutant emissions from hazardous waste burning incinerators (commercial, on-site, and government), cement kilns, and lightweight aggregate kilns. Various concerned stakeholders presented legal challenges to this rule. On July 24, 2001, the United States Court of Appeals for the District of Columbia Circuit granted a petition for review, and vacated selected challenged portions of the rule. On October 19, 2001, the Court issued a stay of its mandate and allowed the Agency four months to develop interim standards. In response to this action by the Court we are now promulgating an interim rule with amended emission standards (see Table 1). The standards established by this interim rule reflect, in certain cases, moderate adjustments from those promulgated by the September 30, 1999 rule. However, we believe this interim rule maintains most of the benefits to human health and the environment projected to result from that rule.

In addition to the interim standards, this rule incorporates selected compliance and implementation amendments first addressed in the rule: *NESHAP: Standards for Hazardous Air Pollutants for Hazardous Waste Combustors - Proposed Amendments*, July 3, 2001. These include: allowing the flexibility for applying a mercury feedrate limit in lieu of complying with an emission standard, and revising startup, shutdown, and malfunction (SSM) provisions. The interim rule also establishes minor revisions designed to help avoid the potential for forfeited capital investments. This could occur if standards promulgated in the anticipated 2005 final rule are substantially different from those established by this interim rule. Our analytical focus in this document is on the interim standards. Aside from the mercury feedrate limit, annualized cost

impacts potentially associated with the other provisions are likely to be negligible¹. Potential cost savings to LWAKs and cement kilns associated with the mercury feedrate limit have not been analyzed but are likely to be highly system specific and have only a marginal impact on the source category, as a whole.

The purpose of this document is to assess cost and economic impacts potentially associated with the interim standards. These impacts are assessed incremental to findings presented in the *Addendum*² prepared in support of the September 30, 1999 rule, and relevant amendments promulgated in the July 3, 2001 Direct Final Rule³. This document does not analyze impacts potentially associated with the previously proposed compliance and implementation amendments finalized by this action. However, as discussed above, we anticipate that these amendments will result in comparatively minor annualized impacts relative to the interim standards.

Analytical Methodology:

This analysis is based on the analytical methodology and findings derived from the economic *Assessment*⁴ and *Addendum*, developed in support of the September 30, 1999 action.

¹ See: *Assessment of Potential Costs, Benefits, and Other Impacts - NESHAP: Standards for Hazardous Air Pollutants for Hazardous Waste Combustors, Technical Amendment to the Final Rule: NESHAP: Standards for Hazardous Air Pollutants for Hazardous Waste Combustors, September 30, 1999*, May 2001.

² *Addendum to the Assessment of the Potential Costs, Benefits, and Other Impacts of the Hazardous Waste Combustion MACT Standards, Final Rule*, July 23, 1999.

³ Assumes the “final” standards, as promulgated in the September 30, 1999 rule, and relevant Amendments from the rule: *NESHAP: Standards for Hazardous Air Pollutants for Hazardous Waste Combustors, Direct Final Rule*, July 3, 2001, represent the current industry baseline.

⁴ *Assessment of the Potential Costs, Benefits, and Other Impacts of the Hazardous Waste Combustion MACT Standards: Final Rule*, July 1999.

The methodology and findings derived from the *Assessment*⁵ prepared in support of the July 3, 2001 proposed rule are also employed, where appropriate. Findings from these analyses are used as the “current” industry baseline. Incremental cost impacts for the interim standards are projected from this “current” baseline using the estimated percent change in the emission level and number of systems requiring control measures under the “current ” baseline vs. the interim standard. This procedure provides a preliminary estimate of incremental cost impacts associated with the interim standards. Incremental benefits are also assessed.

For the economic *Assessment* and *Addendum* we used engineering cost models based on system-specific parameters to estimate compliance costs for the MACT standards. Under this approach, individual combustion systems were assigned air pollution control measures and corresponding cost estimates using engineering parameters such as gas flow rates, waste feed composition, and combustion chamber temperature. From this assignment of pollution control measures, we estimated the capital, and fixed plus variable operating costs that each impacted combustion system would incur in complying with the standards. The estimates of compliance costs also included the costs associated with permitting, testing and record keeping and reporting requirements. Total social costs include the value of resources used to comply with the standards by the private sector, the value of resources used to administer the regulation by the government, and the value of output lost due to shifts of resources to less productive uses. The upper bound estimate of economic welfare loss assumes that all combustion facilities continue to operate at

⁵ *Assessment of the Potential Costs, Benefits, and Other Impacts - NESHAP: Standards for Hazardous Air Pollutants for Hazardous Waste Combustors - Technical Amendments to the Final Rule: NESHAPS: Final Standards for Hazardous Air Pollutants for Hazardous Waste Combustors, September 30, 1999, May 2001.*

current output levels and comply with the MACT standards. The lower bound estimate uses a lower output equilibrium estimated by modeling selected market adjustments in response to the increased costs associated with the rule (i.e., waste consolidation, market exits and price increases are incorporated in the model). In the *Assessment* for the July 3, 2001 proposed rule, we estimated the number of facilities potentially affected by the relevant amendment, then applied corresponding facility level engineering and administrative cost modifications.

Benefits resulting from the September 30, 1999 rule were calculated based on the avoidance of premature mortality and a variety of other adverse human health effects. The basis for the benefits assessment was a multi-pathway risk assessment model that estimated risks in the baseline and for the promulgated standards. This model incorporated both inhalation and ingestion pathways. To develop monetary values for the human health benefits, we used established economic valuation techniques for mortality and morbidity benefits. For mortality benefits, we applied the value of a statistical life (VSL) to the fatal risk reduction expected from the MACT standards. For morbidity benefits, we assigned monetary values using a direct cost approach which focused on the expenditures and opportunity costs averted by decreasing the occurrence of an illness or other health effect.

Findings - Costs:

Compliance cost impacts associated with the interim emission standards vary by source category. The interim standards for existing incinerators are identical to those promulgated in the September 30, 1999 rule, as modified by amendment VI in the July 3, 2001 rule establishing an alternative to the particulate matter (PM) standard. As a result, estimated cost impacts to existing incinerators are projected to be generally equivalent to those presented in the July 1999

Addendum (Table 2), incorporating marginal cost relief as discussed in the May 2001

*Assessment*⁶. The interim emission standards for existing cement kilns are equivalent to those promulgated in the September 30, 1999 rule, except for semivolatile metals (SVM). The semivolatile metals emission standard in the interim rule is relaxed from 240 µg/dscm to 330 µg/dscm. This change is estimated to result in an average 5 percent decrease in total annual compliance costs for this source, as compared to costs presented in the *Addendum* (Table 2).

The interim emission standards for existing hazardous waste burning lightweight aggregate kilns are modified from the final rule standards for dioxin and furan, mercury, and hydrochloric acid/chlorine gas. Projected from the September 30, 1999 baseline, these changes are estimated to reduce per system and aggregate annual compliance costs by up to one-third for this source category (Table 2).

The aggregate annualized social cost impacts associated with the interim standards reflect only a marginal reduction from the impacts associated with the September 30, 1999 rule. The total annualized social costs resulting from the interim standards are estimated to range from \$47

⁶ Section 3.2.2 of the May 2001 *Assessment* estimates maximum potential aggregate annualized cost savings of \$707,500 for up to 5 incinerator facilities potentially able to take advantage of this amendment.

Summary of Calculation: The cost savings resulting from this amendment will have two components: savings in up-front capital costs and operation and maintenance cost savings. The capital cost savings would be a result of not needing a control device that meets MACT PM control standards (i.e., a control device that achieves 0.015 gr/dscf). The unit capital cost saving for the five sources that may take advantage of this standard in a given year is estimated to be \$150,000. Annualizing this amount over ten years, using a discount rate of 7 percent, gives an annual saving of approximately \$21,500 for capital costs per facility.

Operation and maintenance costs for a less complex system would amount to approximately \$120,000 per year per facility. These savings arise from reductions in energy usage (pressure drop devices can be very energy intensive); lower solid waste handling costs, and reduced baghouse maintenance costs. Assuming that five facilities are able to take advantage of this option, the total cost savings per year associated with this amendment would amount to approximately \$707,500. It is important to note that the exact number of facilities that will take advantage of this standard is difficult to determine and is likely to change over time.

million to \$60 million, with a high-end estimate of \$74 million (Table 2). The annualized social cost impacts of the September 30, 1999 rule were estimated to range from \$50 to \$61 million, with a high-end estimate of \$75 million (See *Addendum* tables ADD-6, ADD-7, and ADD-8). Overall, when projected from the September 30, 1999 baseline, aggregate annualized social costs for all sources are projected to decline by no more than 6 percent.

Findings - Benefits:

To the extent we were able to quantify and monetize benefits, the *Addendum* for the 1999 rule estimated human health benefits of approximately \$20 million per year⁷ for selected primary pollutants. Although not monetized, reduced lead exposure to children was another projected benefit. Ecological and waste minimization benefits were also anticipated as a result of the September 30, 1999 rule⁸.

Approximately 90 percent of the total monetized benefits estimate was derived from baseline to rule reductions in particulate matter (PM) emission levels (non-cancer). For the interim rule, the particulate matter emission standard for cement kilns and LWAKs remains unchanged from the September 30, 1999 rule. For incinerators, the interim PM control requirement is unchanged from that established by the July 3, 2001 direct final rule.

For new and existing incinerators, the 1999 rule established a particulate matter emission standard of 0.015 gr/dscf. This level was established as a surrogate for control of non mercury CAA metal hazardous air pollutants (HAPs). The rule also offered an alternative particulate matter emission standard of 0.03 gr/dscf for sources that demonstrate the use of superior federate

⁷ Undiscounted estimate for future cases avoided.

⁸ See the July 1999 *Assessment* for a full discussion of these benefits.

control of metals in their hazardous waste. In the July 3, 2001 direct final rule, we eliminated this alternative particulate matter emission standard and replaced it with metal emissions control requirements. Under this action, no particulate matter emissions standard would apply to the incinerator under RCRA Subpart EEE. However, the incinerator would remain subject to the RCRA particulate matter standard of 0.08 gr/dscf pursuant to §264.343(c). In addition to the 0.08 gr/dscf standard, the alternative standard requires sources to comply with the following four requirements:

- i) A metal emissions limitation for semivolatile and low volatile metals that applies to all Clean Air Act HAP metals, excluding mercury.
- ii) A requirement for the incinerator to demonstrate that it is using reasonable hazardous waste metal feedrate control, (*i.e.*, a defined metal feedrate that is better than the MACT defining metal feedrate floor control level)
- iii) A requirement for the incinerator to demonstrate that its air pollution control system achieves, at a minimum, a 90 percent system removal efficiency for semivolatile metals.
- iv) A set of operating requirements pursuant to 63.1209(n).

We believe that these four components would collectively provide for MACT control of non mercury CAA metal HAPs in the absence of a MACT particulate matter standard. Furthermore, PM emissions, as a surrogate for metal HAPs, are also likely to be comparatively limited. In addition, we have identified only five facilities nationwide that may feasibly apply

this alternative to the PM standard⁹. Thus we believe that, while this amendment would provide targeted regulatory relief to selected sources, on a nationwide basis there would be little or no adverse environmental impacts when compared to the PM standard established in the 1999 rule.

The majority of the cancer risk reductions were linked to the consumption of dioxin-contaminated agricultural products. The dioxin and furan standards in the interim rule remain the same for incinerators and cement kilns and are modified slightly for lightweight aggregate kilns. Because baseline emissions of dioxin and furans from incinerators and cement kilns represent approximately 95 percent of the emissions from the three source categories combined, we estimate that the vast majority of benefits discussed in the 1999 *Assessment and Addendum* are retained.

The interim rule moderately relaxes the semivolatile metal (SVM) standard for hazardous waste burning cement kilns (Table 1). Semivolatile metals are comprised of lead and cadmium. Lead exposure above certain levels has been linked to childhood IQ reductions and high blood pressure in adults. Potential benefits from reduced lead exposure to children were quantified but not monetized in the *Addendum*. Because approximately 70 percent of total semivolatile metals reductions (from all three source categories) were from incinerators, we estimate the semivolatile standard in the interim rule may correlate to marginally reduced lead benefits for children and/or adults.

⁹ *Assessment of the Potential Costs, Benefits, and Other Impacts - NESHAP: Standards for Hazardous Air Pollutants for Hazardous Waste Combustors - Technical Amendments to the Final Rule: NESHAPS: Final Standards for Hazardous Air Pollutants for Hazardous Waste Combustors, September 30, 1999, May 2001.*

Overall, annual monetized plus non-monetized nationwide benefits from the interim rule may be marginally reduced when projected from the September 30, 1999 baseline, as amended by the July 3, 2001 action.

Table 1: Interim Standards for Hazardous Air Pollutants for Hazardous Waste Combustors (February 2002) compared to NESHAPS: Standards for Hazardous Air Pollutants for Hazardous Waste Combustors (September 30, 1999).

***** EXISTING SOURCES *****									
Source Category and Scenario	D/F (ng TEQ/dscm)	PM	Hg (µg/dscm)	SVM (µg/dscm)	LVM (µg/dscm)	TCI (ppmv)	CO (ppmv)	HC (ppmv)	
Incinerators:									
Floor – (September 30, 1999)	WHB: 0.20; or 12 and temperature at inlet to PM control device < 400° F Others: 0.20; or 0.40 and temperature at inlet to PM control device < 400° F	0.015 gr/dscf	130	240	97	77	100* or 10*		
Promulgated – (September 30, 1999)	0.20; or 0.40 and temperature at inlet to PM control device < 400° F or 0.40 for incinerators using wet PM control device	0.015 gr/dscf	130	240	97	77	100* or 10*		
Interim – (February 2002)	same as promulgated	same as promulgated ¹⁰	same as promulgated	same as promulgated	same as promulgated	same as promulgated	same as promulgated		
Cement Kilns:									
Floor – (September 30, 1999)	0.20; or 0.40 and temperature at inlet to PM control device < 400° F	0.15 kg/Mg dry feed	120	650	56	130	100 or 10 100 or 20		
Promulgated – (September 30, 1999)	0.20; or 0.40 and temperature at inlet to PM control device < 400° F	0.15 kg/Mg dry feed	120	240	56	130	100 or 10 (with bypass) 100 or 20 (without bypass)		
Interim – (February 2002)	same as final	same as final	same as final	330	same as final	same as final	same as final same as final		

¹⁰ .

LWAKs:									
Floor – (September 30, 1999)	0.20; or 4.10 and temperature at inlet to PM control device ≤ 400° F	0.025 gr/dscf	47	1700	110	1500	100 or 20		
Promulgated – (September 30, 1999)	0.20; or 0.40 and rapid quench to PM control device ≤ 400° F at the exit of the kiln	0.025 gr/dscf	47	250	110	230	100 or 20		
Interim – (February 2002)	0.20 ng TEQ/dscm; or rapid quench of the flue gas at the exit of the kiln to less than 400° F	same as final	120	same as final	same as final	600	same as final		
Source: NESHAP: Interim Standards for Hazardous Air Pollutants for Hazardous Waste Combustors, Final Rule. U.S. EPA, Office of Solid Waste, <i>Addendum to the Assessment of the Potential Costs, Benefits, and Other Impacts of the Hazardous Waste Combustion MACT Standards, Final Rule</i> , July 23, 1999.									

Table 2: Estimated Cost Impacts: Hazardous Waste Combustion MACT (September 30, 1999) compared to Interim Standards (February 2002).

***** EXISTING SOURCES *****

Source Category and Standard	Percentage of Combustion Systems Requiring No New Control Measures to Meet all Standards [projected form baseline]	Average Total Annual Compliance Costs per Combustion System [assumes no market exit] (million dollars)	Estimated Percent Increase in the Weighted Average Combustion Price (dollars/ton beyond baseline)	Facility Market Exits* [long-term]	Total Annual Compliance Costs [assumes no market adjustments] (million dollars)	Total Estimated Social Cost [after combustion system consolidations] (million dollars)
Incinerators [includes on-site, commercial, and government]:						
Floor - (September 30, 1999)	5% - 19%	\$0.203 - \$0.234 (weighted average across all three types)	up to 2% (commercial)	Commercial: 3 in the baseline, zero incremental On-site: 42 baseline, 13 incremental	\$38 - \$44	\$27 - \$32
Promulgated - (September 30, 1999)	5% - 19%	\$0.225 - \$0.255 (weighted average across all three types)	up to 2% (commercial)	Commercial: 3 in the baseline, zero incremental On-site: 42 baseline, 13 incremental	\$42 - \$48	\$29 - \$34
Interim - (February 2002) [Preliminary]	5% - 19%	\$0.225 - \$0.255 (weighted average across all three types)	up to 2% (commercial)	Commercial: 3 in the baseline, zero incremental On-site: 42 baseline, 13 incremental	\$42 - \$48 ¹¹	\$29 - \$34
Cement Kilns:						
Floor - (September 30, 1999)	12% - 27%	\$0.444 - \$0.677	up to 9%	Baseline: zero Incremental: 0-1	\$15 - \$22	\$15 - \$22
Promulgated - (September 30, 1999)	3% - 21%	\$0.527 - \$0.723	up to 9%	Baseline: zero Incremental: 0-2	\$17 - \$24	\$17 - \$24

11

The July 3, 2001 amendment allowing an alternative to the PM standard may reduce this total by a maximum of \$707,500 per year, assuming a total of five incinerator facilities are able to apply this alternative. It is important to note that the exact number of facilities that will take advantage of this standard is difficult to determine and is likely to change over time. [See the May 2001 *Assessment*]

Interim - (February 2002) [Preliminary]	3% - 24% ¹²	\$0.513 - \$0.709 ¹³	up to 9%	Baseline: zero Incremental: 0-1?	\$16 - \$23	\$16 - \$23
LWAKs:						
Floor - (September 30, 1999)	0% - 13%	\$0.213 - \$0.260	up to 11%	zero	\$2 - \$3	\$2 - \$3
Promulgated - (September 30, 1999)	0%	\$0.307 - \$0.342	up to 11%	zero	\$3	\$3
Interim - (February 2002) [Preliminary]	0% - 10%	\$0.206 - \$0.229 ¹⁴ (Note significant relaxation in Hg beyond floor)	up to 11%	zero	\$2 - \$3	\$2 - \$3

12

Estimated increase of approximately 14-15 percent in the total number of systems requiring no controls to meet the interim SVM standard vs. the September 30, 1999 promulgated standard (Estimates derived from EERGC on 11/15/01, calculated as follows: For the 1999 standard 17 of 33 systems require control for SVM, for the interim 15 out of 33 systems require SVM control. This equals approximate 14.6 percent increase in the percent of total systems requiring no control for SVM. Applied to 1999 standard as follows: $1.146 * 3 = 3.4$, $1.146 * 21 = 24$).

13

Assuming a simple linear relationship between a change in the SVM standard and the corresponding cost of SVM control (based on the proportion of feed control costs applied for SVM control), we estimate *average* per system compliance costs to be reduced by approximately \$14,000 when going from the September 30, 1999 beyond-the-floor standard of 240 $\mu\text{g}/\text{dscm}$ to the interim standard of 330 $\mu\text{g}/\text{dscm}$. Our projections are based on the floor level (650 $\mu\text{g}/\text{dscm}$) to ensure consistency across systems. [Calculated as follows: Control for SVM assumed to be feed control. The feed control (cost surrogate based on technology) represents 31.5 percent of total compliance costs at floor and 38.5 percent at the final standard (apply to column three in table). Floor to final represents a 63 percent change, floor to interim represents a 49 percent change. Feed control costs floor to final - average change is \$64,000. Thus: $63/49 = 64,000/X$, where $X = 49,778$. The difference is approximately \$14,000.

14

Hg and TCl assumed largely controlled by feed control. Feed control (cost surrogate) represents about 55 percent of total average per system costs. Hg and TCl levels relaxed by about 2.5 times, on average. Summary: about 55 percent of total average per system costs reduced by about 60 percent. [Example: $307,000 * 0.55 = 169,000$. $169,000 / 2.5 = 68,000$. $169,000 - 68,000 / 169,000 = \sim 60$ percent reduction.]

TOTALS (all sources):					
Floor -	N/A	N/A	N/A	13 - 14 (Incremental from the pre 9/30/99 baseline)	55 - 69
Promulgated -	N/A	N/A	N/A	13 - 15 (Incremental from the pre 9/30/99 baseline.)	63 - 75
Interim - [Preliminary]	N/A	N/A	N/A	13 - 14 (Incremental from the pre 9/30/99 baseline.)	60 - 74

* Assumes no government units are impacted.

Source: U.S. EPA, Office of Solid waste, *Assessment of the Potential Costs, Benefits, and Other Impacts of the Hazardous waste Combustion MACT Standards: Final Rule*, July 1999.

U.S. EPA, Office of Solid waste, *Addendum to the Assessment of the Potential Costs, Benefits, and Other Impacts of the Hazardous waste Combustion MACT Standards: Final Rule*, July 23, 1999.

NESHAP: Interim Standards for Hazardous Air Pollutants for Hazardous Waste Combustors, Final Rule.

Limitations of Analysis:

The preliminary impacts associated with the interim standards presented in this analysis represent rough extrapolations based on an assumed linear correlation between the percent change in standards and the cost of control. No modeling was completed in support of these estimates. In addition, ongoing market fluctuations since the *Addendum* was completed may result in moderate to significant data discrepancies (prices, control costs, waste quantities, system universe, etc.), in some cases. However, on a nationwide basis, we anticipate that economic impacts associated with the interim standards will be generally equivalent to those estimated in the July 23, 1999 *Addendum*.